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TICK-BORNE FEVER AS A CAUSE OF ABORTION IN SHEEP—PART I

BY

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Lyle Stewart (1936) suggested that tick-borne fever was a cause of abortion in sheep and Harbour (1945) also considered that this was the case. That this can only be so under certain conditions is obvious since abortion is not present on the majority of tick-infested farms. For example, Harbour (1945) considered that the high abortion rate (30 per cent. and 16 per cent.) observed when non-acclimatised ewes were moved on to tick-infested land was due to tick-borne fever. He also pointed out that in the Borders, hill hoggs (ewe lambs) wintered away on tick-free ground may entirely miss the spring cycle of tick activity and only meet with tick-borne fever infection again as pregnant gimmers when abortion may occur as a result of tick-borne fever. Abortion also occurs on farms where the tick infestation is comparatively light and again it is suggested that tick-borne fever is the cause. It is assumed in all these cases that the aborting sheep have either lost their "immunity" to tick-borne fever or have never obtained any immunity. It also follows that sheep on tick-infested farms where there is only a spring tick cycle are assumed to retain their "immunity" from year to year.

The present investigation was carried out in an endeavour to clarify the position regarding these assumptions.

THE EXPERIMENTAL PRODUCTION OF ABORTION IN SHEEP BY TICK-BORNE FEVER

BOGHALL EXPERIMENTAL FARM

The object of the following experiment was to determine the effect with special reference to abortion, of inoculating tick-borne fever infective blood in (*a*) ten Black-face susceptible pregnant gimmers; (*b*) ten Black-face ewes of mixed ages which had been born and reared on a tick-infested farm in Aberdeenshire. For this period of the experiment both groups were grazed on a tick-free pasture, having been tupped so that lambing would commence at the end of April.

On March 23rd all 20 pregnant sheep were inoculated subcutaneously with 10 c.c. citrated infective blood. The strain of tick-borne fever used was that freshly isolated from sheep on a Border farm. It was passaged twice through susceptible lambs which gave the typical febrile reaction, tick-borne fever being confirmed by microscopical examination of blood smears. The blood used as inoculum was taken from the second passaged lamb at the height of the temperature reaction (107·5°). Temperatures of all sheep were taken before inoculation (maximum 102·7°), and thereafter daily for 14 days. Blood films were made from all sheep on the fourth, fifth and sixth days and examined for tick-borne fever bodies.

Results. (See Table I.) (For tables see pages 466-468.)

Susceptible Sheep.—All sheep in this group showed tick-borne fever bodies in their blood and all but one showed typical temperature reactions. They were noticeably ill for several days. Five of them aborted within the period seven to ten days after inoculation, four lambed normally and one was barren. Examination of the aborted lambs was negative for pathogenic bacteria.

Acclimatised Ewes.—Apart from one animal which died of blackquarter following inoculation, these sheep showed no temperature reaction, no illness and no tick-borne fever bodies. Eight out of the nine surviving animals lambed normally, one being barren.

IMMUNITY TO TICK-BORNE FEVER

Gordon *et al.* (1932) state that a specific immunity to tick-borne fever can be produced in sheep after either one or on occasion several injections of infected blood. Jamieson (1947), however, considers that immunity is probably dependent upon constant repeated infection and that removal of sheep to tick-free pastures for a period of six months results in a marked lowering of immunity to the disease. Since immunity to tick-borne fever would appear to play a part in the prevention of abortion in sheep it was decided to carry out a small scale experiment on the persistence of immunity.

The experimental sheep used were the gimmers and ewes with their surviving lambs which had already been used at Boghall for the production of abortion by tick-borne fever. As already stated, these ewes were inoculated with virulent T.B.F. blood on March 23rd; the Aberdeen sheep being already immune gave no or very little reaction, while the local sheep gave a T.B.F. reaction.

Every two months after this date the immunity of two of these sheep was challenged by inoculation of 10 c.c. of virulent T.B.F. blood given subcutaneously. The strain of T.B.F. used was the same as that used in the initial experiment and kept going by repeated passage through susceptible lambs. The experiment extended over a period of 12 months from the date of the original inoculation. The results are given in Table II, and with one exception the challenging dose caused no significant temperature reaction nor the presence of T.B.F. bodies in the blood over the 12 months' period. Control susceptible sheep gave a very definite tick-borne fever reaction in every case.

A similar experiment was carried out on the lambs of the Boghall abortion experiment. The lambs when three months old were inoculated subcutaneously with 10 c.c. of the same strain of T.B.F. as given above. All the lambs gave the usual signs of tick-borne fever and this was confirmed by demonstrating T.B.F. bodies in every case. Thereafter two were challenged with 10 c.c. of virulent T.B.F. blood approximately every two months for a period of eleven months. (It was intended to extend over 12 months, but this was not possible.)

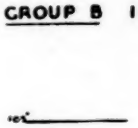
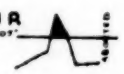
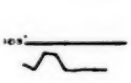
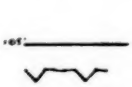
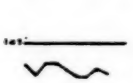
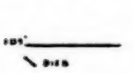
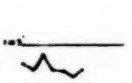
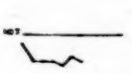
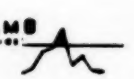
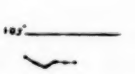
The results are given in Table III in which it will be seen that the majority of lambs gave no significant temperature reaction; two lambs, however, did have a small

temperature rise. In no case could tick-borne fever bodies be demonstrated on daily examination.

It has been observed for some time that in the Border counties of Scotland certain farms, where tick infestation was only slight or where tick infestation was comparatively recent, had an annual incidence of abortion, especially amongst the gimmers and to a less extent amongst the second crop ewes. On some farms the abortion was confined to certain hirsels. The incidence varied from farm to farm, but was never very high, being about 5 to 10 per cent. of the affected age groups. In contrast, abortion was not a feature of the more heavily tick-infested farms. It was considered a possibility that on such farms immunity to tick-borne fever was not sufficiently widespread in the younger age groups to give an over-all immunity to the fever and that resulting abortion would occur at least in some of the gimmers and second crop ewes.

It was decided that the immunity of hoggs and gimmers to tick-borne fever might be estimated on two tick-infested farms, one farm (Farm B) having few ticks and a 5 to 10 per cent. incidence of abortion amongst the gimmers and second crop ewes, the other farm (Farm G) in the same area having a relatively high tick infestation and no abortion. It had previously been demonstrated in a number of cases of abortion on Farm B that tick-borne fever bodies were present in the blood immediately after the abortion. Louping-ill on Farm B was unknown but common on Farm G. On both farms the immunity to tick-borne fever of ten hoggs and ten gimmers was challenged by the inoculation of 10 c.c. of T.B.F. blood subcutaneously during the autumn period (November). The results showed that on Farm G the immunity to tick-borne fever was complete, whereas on Farm B eight of the ten hoggs and four of the ten gimmers were not immune.

TABLE I

GROUP A SUSCEPTIBLE		GROUP B IMMUNE	
B2	Lambed normally	41	 Tup Eild
B2 CMR	 Aborted 2-4-46	79	Lambed normally
B5	Aborted 2 4 46	54	 Lambed normally
B5 CMR	Aborted 2-4-46	14	 Lambed normally
B2 CML	Lambed normally	36	 Lambed normally
H R H	Aborted 31-3-46	47	Lambed normally
T S	Lambed normally	1	 Dead
T S C M R	Aborted 30 · 3 · 46.	21	 Lambed normally
T S C M L	Tup Eild	38	 Lambed normally
T S C M B	 Lambed normally	31	 Lambed normally

Field "Vaccination" Experiment

Since the above observations suggested that a degree of immunity could be obtained to tick-borne fever it was considered that "vaccination" of hoggs and gimmers on Farm B with a strain of tick-borne fever just before tupping might prevent the onset of natural tick-borne fever in the following spring, and if this disease was the cause of the abortion then the vaccination should prevent this also. For this experiment 20 hoggs and 20 gimmers were inoculated subcutaneously with 10 c.c. of virulent tick-borne fever blood several weeks before tupping. They were then allowed on the hill. This inoculation caused a very definite check in a number of the thriving sheep. A similar number of animals in each group were left as controls. Adequate marking of both groups was carried out. The abortion rates in the two groups in the following spring were:—

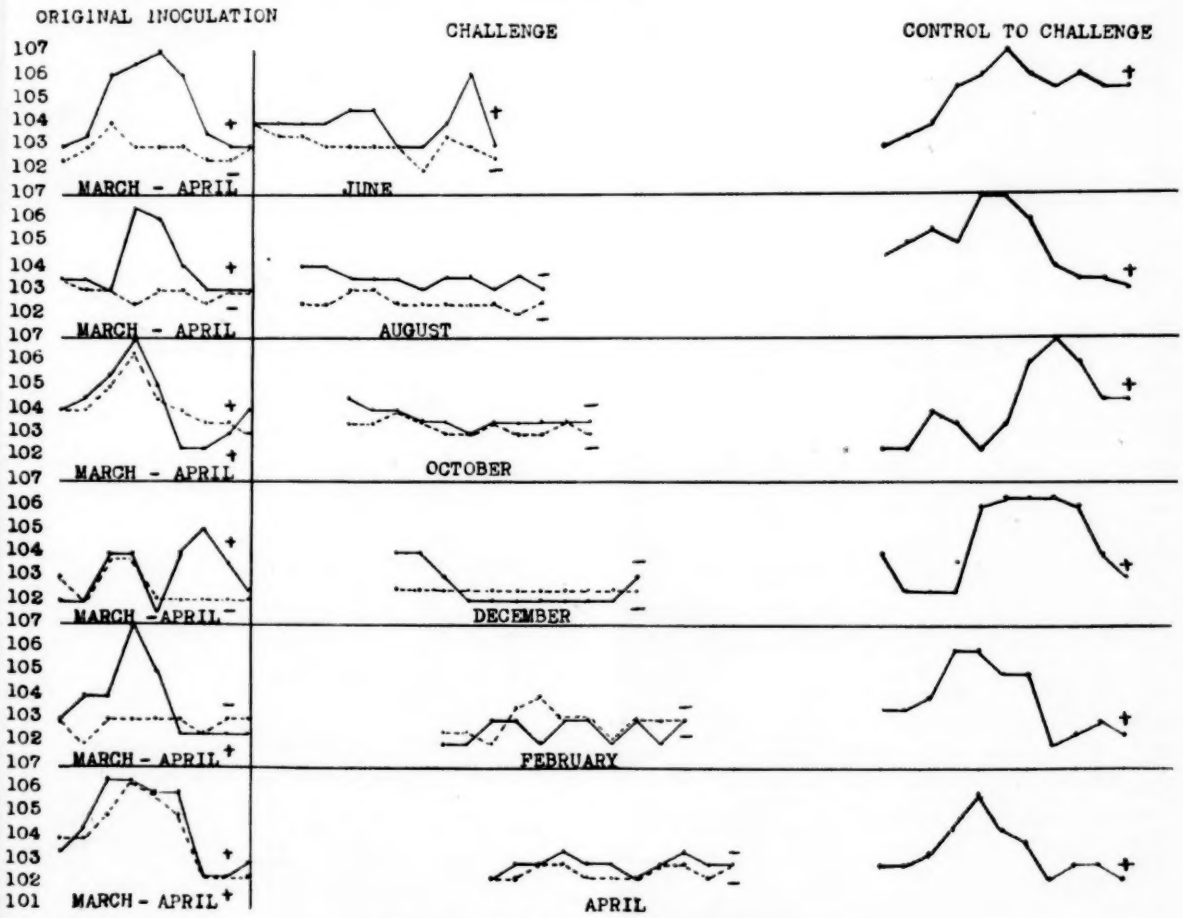
40 sheep in inoculated group—no abortions.
40 sheep in control group—five abortions.

Discussion

There is little doubt from the above results that tick-borne fever is capable of causing abortion when pregnant sheep are affected near the lambing time, while immune control sheep showing no evidence of tick-borne fever after inoculation, lambed normally several weeks later.

The whole question of immunity to tick-borne fever is complicated, but the present results suggest that one inoculation of 10 c.c. of virulent T.B.F. blood is sufficient to give a considerable degree of immunity to a similar challenge dose for a period of 12 months. In the present experiment this applied to both lambs and their mothers, the lambs receiving their first inoculation at three months. Our findings are in agreement with those of Gordon *et al.* (1932), who state that a specific immunity can be produced after either one or on occasion several injections of infected blood. A similar lasting immunity in gimmers to such a challenge dose was also seen on the heavily tick-infested Border Farm G for a period of at least eight months. These findings are not in agreement with those of Jamieson (1947), who stated that immunity under field conditions is dependent upon constant repeated infections and gave field evidence to support this. On Farm B where tick infestation was only slight the immunity of hoggs, gimmers and second crop ewes was by no means over-all, and this suggests that many of these sheep did not become infected with tick-borne fever in their earlier years or that the immunity was insufficient to carry over the tick-free periods

Table II



from spring to spring. On the present experimental evidence the former would appear to be the more likely.

From the experimental results the following deductions can be made regarding the occurrence of T.B.F. in pregnant gimmers and ewes and the consequent risk of abortion.

(1) Adult sheep born and reared on heavily tick-infested farms are immune to tick-borne fever and therefore to this cause of abortion.

(2) Susceptible sheep introduced to tick-borne fever when pregnant will abort in considerable numbers. This may occur when sheep are brought on to tick-infested pastures and introduced to T.B.F. for the first time before lambing or when sheep are reared on very lightly tick-infested pastures not obtaining an immunity to T.B.F. before pregnancy.

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PART II

BY

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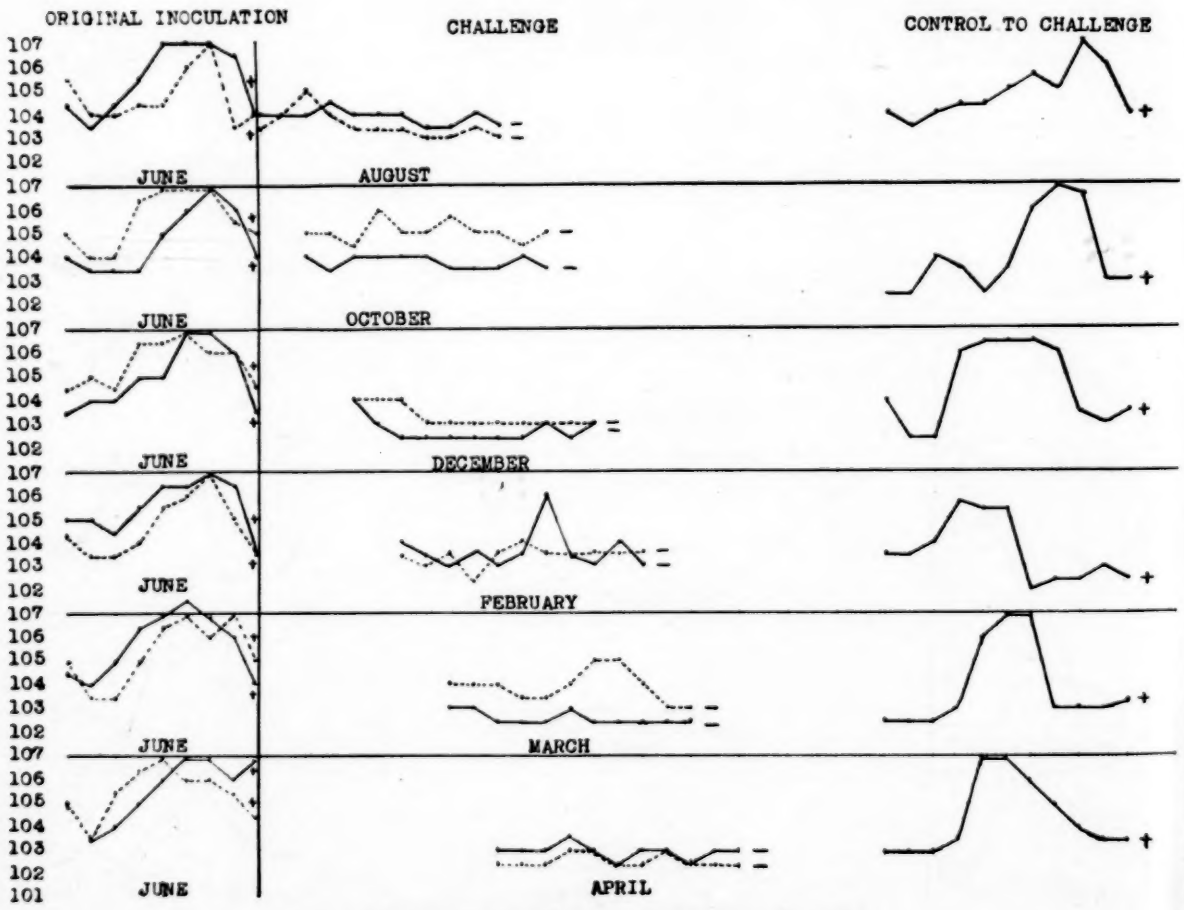
FIELD EVIDENCE

Farm G. Kincardineshire.—This is a farm known to be heavily tick-infested. In October, 1944, 68 gimmers were purchased from a farm free from ticks and placed on hill pasture on farm G. In January and February, 1945, 23 of the gimmers aborted and eleven died. The sheep were vaccinated with louping-ill vaccine before their introduction to the farm. It was possible to examine thoroughly only four gimmers, two dead, two alive and three foetuses. No evidence of bacterial infection was found. Tick-borne fever bodies were recognised easily in the blood of the two gimmers alive. The temperatures of these animals were 105·6° F. and 106·2° F. respectively the day following abortion.

TABLE III



Farm F. Inverness-shire.—Eighty gimmers were purchased in October, 1946, and introduced to this tick-infested farm. In February and March, 1947, 41 aborted, 16 of which died. Tick-borne fever was diagnosed in 18 of the gimmers. It was subsequently found that the native farm of the gimmers was free from ticks.

In view of these cases and cases with a similar history reported to me by Harbour (1946) it was decided to test experimentally the effect of tick-borne fever infection on pregnant susceptible ewes and on pregnant immune ewes.

Experimental

Glensaugh Hill Farm Research Station was chosen because it is well known to be tick-infested and louping-ill and tick-borne fever are known to occur. In introducing susceptible sheep it was, therefore, necessary to inoculate with louping-ill vaccine prior to the start of the experiment. Unfortunately, owing to the unavoidable delays in obtaining the susceptible sheep, it was not possible to inoculate with louping-ill vaccine until the day of commencement of the trial, and sheep were obtained so late that lambing in the controls started soon after the commencement of the experiment.

Ten Black-face gimmers were purchased from a farm known to be tick-free, and these constitute Group B. Group A consisted of ten Glensaugh-bred ewes of five to six years of age. Both groups were inoculated on April 1st, 1946, each with 10 ml. of infective tick-borne fever blood and 5 ml. of louping-ill vaccine. The tick-borne fever blood was that used by Stamp and Watt in their experiments. After inoculation all sheep were put on to a tick-infested paddock and temperatures recorded daily.

Results are shown in Table I.

It will be observed that in Group A all the ewes lambed full-term lambs except No. 147 which lambed twins alive, but probably about one week premature. Ewe 125 lambed on April 11th. Her lamb was dead and had probably been dead at least two days before lambing.

The ewes in this group had no apparent setback, although some showed a rise of temperature.

In Group B, on the other hand, all the gimmers were very dull and sick two days after inoculation, and were found scattered all over the paddock. It was impossible to gather them with a dog. With one exception (No. 194) all animals in this group lambed prematurely. All lambs were born dead or lived only a short time and only four

TABLE I EWES & GIMMERS INOCULATED T.B.F. 1/4/46 GLENSAUGH

GROUP A Home bred ewes	LAMB	DAYS AFTER INOCULATION	EWE
1·8	Normal	9th	Alive
1·25	Normal Dead	11th	Alive
1·29	Normal	6th	Alive
1·39	Normal	3rd	Alive
1·40	Normal	6th	Alive
1·46	Normal	4th	Alive
1·47	TWINS 1 WEEK premature	11th	Alive
1·52	Normal	4th	Alive
7·25	Normal	7th	Alive
7·49	Normal	17th	Alive

GROUP B Purchased gimmers	LAMB	DAYS AFTER INOCULATION	EWE
4 187	Aborted Dead	9th	Alive
4 188	Aborted Dead	8th	Dead
4 189	Aborted Dead	8th	Dead
4 190	Aborted Twins 1 dead 1 alive 1/2 a day	6th	Dead
4 191	Aborted Dead	20th	Alive
4 192	Aborted Dead	6th	Dead
4 193	Aborted Dead	7th	Dead
4 194	Still carrying lamb	23/4/46	
4 195	Aborted Dead	11th	Alive
4 196	Aborted Dead	8th	Dead

of the ten gimmers survived. The brains of all dead ewes were examined for louping-ill, but results were negative.

Ticks were counted in botn groups on April 11th. Tick numbers averaged 83 per ewe in group B and 52·4 per ewe in group A.

Discussion

The interpretation of the effects of tick-borne fever infection in field outbreaks will remain complicated so long as the criteria of diagnosis are only temperature reactions and the demonstration of tick-borne fever bodies. Experimentally, interpretation is severely restricted, due to the techniques available. This is especially so when the experimental design involves immunity studies. For instance, Gordon *et al.* (1932) report specific immunity to tick-borne fever in sheep following injections of infected blood. This is now confirmed by Stamp and Watt (1950). Observations in the field suggest that immunity would appear to be dependent upon the size and duration of the dose (Jamieson, 1947). Until, however, the infecting agent is isolated and variations in strains and the quality and quantity of " an immunising dose " are determined, and a technique evolved to produce graduated infecting inocula, interpretation of results must remain restricted.

There appears little doubt, however, that pregnant sheep from farms free from tick infestation abort when introduced to tick-infested farms. It is not possible at this stage to assess whether abortion is due to specific qualities of the tick-borne fever infecting agent or is a simple reaction to the febrile state.

Deaths following tick-borne fever infection are not in keeping with the observations of Gordon *et al.* (1932), or Brownlee (1935). At Glensaugh station, however, deaths from tick-borne fever have been observed previously (Jamieson, 1947).

In this experiment six out of ten sheep in the non-immune group died, apparently as a result of tick-borne fever infection. It is difficult to correlate these findings with those obtained by Stamp and Watt (1950), where no deaths occurred, although the infective material was from the same source. It may be significant that the only apparent difference between the experiments at Boghall and Glensaugh is that the former was tick-free and the latter tick-infested.

Acknowledgments.—I am indebted to Mr. G. Jamieson, farm manager at Glensaugh Experimental Station, and Mr. J. J. Thompson for their help in the field.

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DROUGHT CATTLE LOSSES IN TANGANYIKA

About a million head of cattle perished in last year's drought in Tanganyika, according to a report of the Livestock Board, says the Dar es Salaam Correspondent of *The Times*.

Members of the Board have recommended that an emergency scheme should be prepared by the Department of Veterinary Services to deal with the removal of livestock should there be a recurrence of large-scale losses. The Board considers that it should be possible to forecast by the end of April each year whether a state of drought would occur.

It is recommended that holding grounds should be set up near stock raising grounds and the railway.

THE VETERINARY CONTROL OF PRODUCTS OF ANIMAL ORIGIN

BY

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The well-known German journals *Fleisch und Milchhygiene* and *Die Schlachthofzeitung* having ceased to exist, for almost five years now the *Deutsche Tierärztliche Wochenschrift* has tried to bridge the gap by publishing a number of articles dealing mainly with the research side of meat and milk hygiene. The valuable discussion on the practical aspects of these subjects had, however, to be omitted or at least be given second place because of the general character of this periodical.

To replace the missing journals and to supply the members of the profession employed in the inspection and control of meat and milk with the information they require—also to give them a forum for valuable discussion—Professor Schönberg, of Hannover Veterinary College, the renowned authority on food and its problems, decided to issue a supplement to the *Deutsche Tierärztliche Wochenschrift*. It was first published on January 1st, 1950, and is known as *Der Lebensmitteltierarzt* (*The Food-Veterinarian*), a title chosen by the editor himself, because in his opinion the veterinarian of the present-day employed in the food field, besides being responsible for inspection and control, is also the most valuable adviser and collaborator in its production and processing. However, to obtain the right to call oneself a " Food-Veterinarian " specialisation is required, the necessity for which, according to Professor Schönberg, is fully appreciated by the members of the German veterinary profession, but the question of how to acquire this specialised knowledge and status is still under discussion.[3]

Opinion is divided; one group advocates the extension of the veterinary curriculum by at least six months, during which time the candidate should specialise in all branches of food hygiene, and, after passing an examination, acquire the right to take up a post as a " Food-Veterinarian." The other group is strongly opposed to any extension of the curriculum because they maintain that it embraces everything the veterinarian requires for a basic training. They say that to become a specialist extra post-graduate training is required and Professor Schönberg, the leader of this group, advocates a practical course in two parts and lasting for at least three months. The first part, dealing with meat and meat food products, would take place in a first-class abattoir where the candidate would take part in the administration and gain first-hand knowledge of the construction, maintenance and running of the plant. Here he would also come in close contact with the members of the meat trade and thus become acquainted with the demands and customs of the people with whom he will work. The second part of the specialisation would take place in a Veterinary Institute for Meat and Milk Hygiene attached to a College or Faculty where the candidate would carry out all the tests required in the control of meat and milk foods. Whether the candidate should sit an examination after the completion of this course or if it would be sufficient to recognise a testimonial from those who have instructed him during the course of specialisation, is a matter still awaiting discussion.

Before voicing one's own opinions it might be advisable to recount the details of the German veterinary curriculum so far as the subject of meat and milk is concerned. The academic year is divided into two semesters. During the

sixth and seventh semester, or our second half of the third year and first half of the fourth, the student is introduced into the science of food production and inspection, attending three lectures weekly on meat and two hours on milk. The eighth and ninth summer semesters are reserved for four weekly demonstrations in general food inspection and two weekly lectures on meat inspection proper. During the eighth and ninth winter semesters another three hours are reserved for the same subjects, besides one lecture per week dealing with the administration and management of abattoirs and another giving practical instruction in milk control. The student of the eighth and ninth semester has the opportunity of joining a special course dealing with the practical side of meat inspection only. This course is voluntary and takes place in the abattoir of the University town.

Such a number of lectures and practical classes naturally demands a substantial staff. Besides a professor, who is the director of the department, there is generally one reader, together with one senior and one or two junior lecturers, as well as a few demonstrators who, as a rule, are preparing for the degree of Dr. med. vet. The Department is an independent chair, not only in the Faculties but also the Veterinary Colleges, under the name of " Department of Meat and Milk Hygiene " or " Department of Food Science."

There cannot be any doubt that the German curriculum intends to prepare the student for a practical veterinary career as well as for food inspection. A solid foundation is given during the course of study and all that then is really necessary is a short specialisation course after the candidate has qualified.

How does this compare with the British curriculum ? It is unnecessary to go into detail with regard to the hours of lectures or practical classes the student spends on meat, as this is well known to members of the profession. This extremely important subject has not even its own place in the curriculum but is concealed under medicine. Without doubt the latter is one of the fundamental subjects of the curriculum and final examinations, but nevertheless only remotely connected with meat and food hygiene except for the *ante-mortem* inspection. The remaining major part of the " Food-Veterinarian's " duties, on the other hand, are very closely connected with pathology and bacteriology. How many independent departments of Meat and Milk Hygiene at present exist in the British Veterinary Colleges or Faculties ? It is true that a post-graduate course in Veterinary State Medicine emphasises the importance of meat and milk hygiene, but can it replace a basic education ? How many graduates can afford nowadays a whole extra year outside the normal five-year curriculum ? Too few to cope with the actual demand, once Britain has introduced a considerably higher standard of meat and food inspection such as exists at present in the U.S.A., Germany and some other countries of the Continent.[4] There the veterinarians share the major responsibility in four fields, *i.e.*, meat inspection, milk sanitation, inspection and establishment of standards for animal produce and the control of animal diseases transmissible to man.

There has been a perceptible lack of public health interest on the part of the veterinarian in the past, mainly because he has been denied duties he can undoubtedly call his own. Should this, however, be an argument or excuse for giving such an important subject as meat hygiene a secondary place ? " There is definite evidence to support the belief that we are at the cross-roads on this question, where, instead of the veterinarian having to convince the public of the need for adequate food inspection, the public is now coming to the veterinarian, insisting that this type of service be provided. The evidence presented before Congress relative to the financing of federal meat inspection, emphasises the need for adequate, universal veterinary inspection of (United States) meat and meat-food products." (Kingman[1])

Schönberg's idea is shared by the majority of America's veterinarians, as is proved by the result of a questionnaire circulated in 1948 by the American Veterinary Association. The answers to the questions put to the members of the American veterinary profession emphasise that, from the standpoint of basic training, the veterinarian is the only one qualified to render adequate service in food inspection work. From the replies received, however, it is concluded that the veterinary colleges cannot turn out finished, experienced food inspectors who are able to step into responsible positions in an existing food-inspection system or else organise a system where one is not already in existence. This fact, it is emphasised, does not constitute a criticism of the present American veterinary curriculum which stresses the importance of meat and milk hygiene in every way, but merely points out the necessity for the establishment of post-graduate facilities, such as specialisation in University institutes dealing with these subjects, public health departments and meat packing plants.

To quote Dr. Mather[2], a medical authority on public health in the U.S.A., " Until recently neither the officials concerned with public health administration nor those responsible for the training of veterinarians have appreciated the potential contribution of veterinary medicine to public health. In the most general terms, the chief contribution that the veterinarian can make to public health is in the field of food control. The term ' food control ' is used in its broadest sense to cover food production, processing and handling. By virtue of his training, the veterinarian is the individual best able to cope with these problems." . . . . " No thinking public health administrator to-day," continues Dr. Mather, " will deny that the veterinarian is an essential figure in a well-balanced health unit."

References

[1] Kingman, H. E. (1949.) *J. Amer. vet. med. Ass.* **114.** 385–387.
[2] Mather, J. M. (1949.) *Ibid.* **114.** 120–123.
[3] Schönberg, F. (1950.) *Der Lebensmitteltierarzt.* No. 1. 1–2; 11–13.
[4] Thornton, H. (1949.) " Textbook of Meat Inspection." Preface and p. 524. London.

DEARER GLYCERINE

The manufacturers of glycerine announce that, as from August 1st, 1950, the price of 25 ton lots will be advanced by £40 a ton to £165 6s. a ton, the highest that glycerine has ever reached in Britain. The pending increase is stated to have been made so as to bring the home price more closely into line with the rates charged by manufacturers abroad. Even with the new increase British prices will be below those charged in America (£240 a ton ex works, compared with £500 a ton in 1946) and on the continent of Europe, where the prices vary from £220 to £225 a ton. In this country the peak price of £140 per ton was reached in 1920, but by 1926 the rate had fallen to about £100 a ton, and in 1939 it had dropped to £62 10s., with ample supplies available. The new rate will apply to permits issued for August and it is understood that the supply position shows no signs of improvement. In fact, if some supplies were not available from India and the Far East glycerine would be much scarcer. America is anxious to purchase glycerine, and there is the ever present danger that British foreign suppliers may be induced to sell their production to the U.S.A. in order to obtain dollars. Nor is it thought that the ending of soap rationing will have much effect on the amount of glycerine available. Whether in the event of the international situation worsening supples will be tighter still and the price even higher remains to be seen.—*Pharm. J.*

CLINICAL COMMUNICATION

CASTOR BEAN POISONING

T. GEARY,

LARNE, NORTHERN IRELAND

Castor oil is obtained from castor beans by pressure or extraction. The residue contains the poisonous principle ricin which is water soluble and therefore does not contaminate the oil.

Ricin is a severe irritant and has some very peculiar characteristics. It is a toxalbumin or phytotoxin and in many ways resembles bacterial poisons. For example, it is possible to immunise an animal against its action by giving small weekly doses, either orally or parenterally. The presence of antibodies can be demonstrated and these antibodies can confer a passive immunity on another animal.

Anaphylaxis has been noticed after the inhalation of castor seed dust, followed by the intravenous injection of a dust extract. Cases of asthma have occurred amongst the workers in castor oil factories, following the inhalation of the dust.

Ricin also causes agglutination of the red blood corpuscles, and it is thought that this agglutination, resulting in thrombosis of small capillaries, accounts for the haemorrhages seen in some of the viscera of animals poisoned by castor bean.

The farm where the poisoning occurred consisted of a Grade C dairy, an accredited poultry station, with pig rearing and fattening.

Two bags of layers' mash were delivered to the farm on the afternoon of April 14th. One of these was emptied into a barrel and the other left aside. Mashes were immediately prepared from this meal and given to a year-old bull, a six-months-old heifer, a sow with a litter of ten pigs, two pregnant sows, a boar and three weaned pigs. A warm drink was prepared for a cow with a retained placenta. A small quantity was given to 50 two-to-four-months-old pullets. A full meal was given to the laying stock. A smaller mash was made up later in the day, but was refused by all the stock, except the hens. Due to some misunderstanding, a non-pregnant sow was not offered any food that day.

In the evening all the pigs had vomited and were dull, as were the bull and heifer.

Next morning a disastrous state of affairs was found, which was all the more obvious because all the affected stock (with the exception of the poultry and the cow) were kept in pens in a piggery.

All the pens occupied by the pigs—save one allotted to the sow which had not received any food—were littered with fluid faeces and vomit. The heifer was dead and the bull evidently was very ill. But the first thing to strike one's attention was the absence of poultry from the runs. The young pullets were crowded together in a house with their wings drooping, feathers ruffled and comb and wattles a greyish colour. The adult fowl seemed to be much brighter, but refused to leave the houses and arks. Some were on the nesting boxes, and the cocks were crowing with great gusto.

The piggery was in a mess. One of the three weaned pigs had a convulsion and died almost immediately. The sows and boar (except the sow which had been forgotten and which was normal) were stretched out on the floor, looking very dejected. The skins of their ears, flanks and hams were cyanotic. When forced to rise, all displayed weakness and inco-ordination of gait. The boar and one of the pregnant sows showed signs of abdominal pain. All had intense thirst.

The litter of ten were in varying degrees of sickness. The majority were normal and hungry and obviously annoyed at the non-co-operation of the sow. Some were dull and two were very ill. At this point vomiting had ceased, but the diarrhoea was becoming more frequent and more fluid. No blood was noted. Temperatures were either normal or sub-normal.

The heifer seemed to have died where she had dropped. There was tympany of the rumen. No blood was noted and *rigor mortis* was definite.

The young bull was propping himself up with widely separated legs, grinding his teeth and grunting and swaying with each laboured respiration. The rumen was very firmly impacted. Pressure on it and the chest caused great pain. All ruminal sounds had stopped, but there were some sounds over the omasum. The temperature was subnormal. There was no diarrhoea at this stage, but a little was seen just before death, which occurred two hours later.

Two young calves which were in the same pen as the bull and heifer had been fed on milk and were normal.

The cow's back was slightly arched; she was very dull and moved with obvious pain. She was passing foetid faeces. The temperature was 103° F.

It seemed clear that the stock had taken some irritant poison, either with the meal or in the meal. The Veterinary Laboratory, The Farm, Stormont, accordingly was consulted by telephone, and one of the staff came down that afternoon and carried out *post-mortem* examinations. In the meantime, the adult pigs were given ½ lb. of butter each and unlimited supplies of diluted boiled milk with kaolin and chalk.

The bull was found dead in the afternoon. There were no deaths as yet among the fowl, though some showed impacted crops and diarrhoea.

Post-mortem EXAMINATIONS

Pig.—Intense inflammation of the gastric mucous membrane, particularly at the cardia. There was slight inflammation of the duodenum, but apart from this no abnormality was seen in the bowel. There was a slight cystitis.

Heifer.—Slight inflammation of the rumen. Abomasum inflamed. Small and large intestine normal, but caecal contents very fluid. Mild cystitis.

Bull.—Little inflammation of the rumen. Slight inflammation of the reticulum. Intense abomasitis and enteritis. The bowel contents seemed to be mainly extravasated blood. Slight cystitis. All the other organs appeared to be normal, apart from some venous congestion.

In view of the constant finding of cystitis in all three cases, a more minute examination of the kidneys was made, but failed to show any macroscopical lesions.

Post-mortem specimens, bowel and ruminal contents and samples of meals were taken to the laboratory. In order to protect the interests of the farmer, samples of meal were taken, sealed and witnessed by a police officer, and, together with the viscera of a hen which had died, were sent to the public analyst.

All the fowl at this stage showed grossly impacted crops and diarrhoea. Egg production had dropped almost to nil. The fowl that had died showed inflammation of the mucous membranes of the oesophagus, crop and true stomach. Unsuccessful attempts were made to "milk" some of the crop contents away from some of the birds, but it was found to be quite impossible. Several of the birds were operated on and the crop contents removed. A

thin paste made of flour, kaolin and water was introduced before closing the wounds. None of the subjects of this treatment survived, although they were much brighter a short time after the operation.

Reports received from the Veterinary Laboratory and the public analyst showed the presence of castor bean husks in the meal and ingesta.

The Results of the Poisoning

The most disastrous effects were on the fowl and cattle. Two of the cattle died very quickly and the cow was obviously dying when sent to the knacker's two days after receiving the meal.

The crops of the fowl remained impacted for seven to ten days; all had diarrhoea, egg production was nil and all immediately commenced to moult and continued to do so until the flock was disposed of about the middle of July. During this time there was a steady death roll of one or two fowl every day. The last time the flock was examined was on July 11th. Although the majority of the birds looked fairly bright and well feathered, handling and closer examination showed the bodily condition to be very poor. The heaviest bird weighed 4¼ lb., the thinnest between 2½ lb. and 3½ lb.

Several birds were selected at random and *post-mortem* examinations carried out. All of them showed extreme emaciation, tuberculosis of the spleen and liver, and variable chronic thickening of the mucous membrane of the large intestine. One showed ascites and another an extensive neoplastic growth involving the peritoneum. It was concluded that the lowered body resistance left the birds more susceptible to other conditions.

It was thought that the vomiting saved the pigs. These animals, except the two seriously ill sucking pigs which died, gradually recovered, although it was not until July that they started to improve in condition. The two pregnant sows gave birth to viable litters which they suckled and weaned successfully. One of them developed metritis, and for some time after weaning the litter was very slow in movement and showed a large pendulous abdomen. Percussion of the abdomen revealed a wave, but it was not certain if this was due to fluid. The risk of an exploratory puncture was not taken. The impression obtained was that there was some liver damage and ascites. With good feeding this gradually disappeared. All the sows are again in pig.

Anthony, in "The Diseases of the Pig," states:—"A period of time elapses between the ingestion of foodstuff containing castor bean husk and the onset of symptoms." Steyn, in "The Toxicology of Plants in South Africa", agrees, but states that if larger amounts are eaten general weakness and collapse may set in almost immediately.

From this it could be assumed that large quantities of castor bean husk had been eaten by all animals concerned.

In the case of the hen 0·75 grammes of castor bean husks were found in the crop contents. But Steyn quotes 14 grammes per kg. bodyweight as the lethal dose of castor seed administered in one dose, *i.e.*, it would take (approximately) 32 grammes to kill a 5 lb. hen.

For cattle he quotes the lethal dose as 2 grammes per kg. bodyweight, *i.e.*, 360 grammes (approximately) would be required to kill a bull between 3 and 4 cwts. The bull consumed a mash of approximately 5 lb. weight. Therefore, the meal eaten by the bull would have a concentration of 15 grammes per 100 grammes of meal. The highest concentration of castor bean husk in any of the samples taken, however, was 1·2 grammes per 100 grammes of meal.

If my calculations are correct they show that castor seed husk is more toxic than is assumed in these reliable publications.

Analyst's Report

(1) Crop contents of hen—There was present 0·75 grammes (12 grains approx.) of castor seed husk in 110 grammes; (2) Sample of meal, top layer—There was present 1·2 grammes of castor seed husk in 100 grammes; Sample of meal, middle layer—There was present 0·3 grammes of castor seed husk in 100 grammes.

Acknowledgments.—I wish to thank Drs. Lamont, Kerr and Pearson for their help and advice.

ABSTRACTS

[Certain New Pharmaceuticals as Applied to Internal Medicine and Surgery. Davidson, J. L. (1950.) *Vet. med.* **45.** 68–73.]

The origin and uses of a number of preparations are summarised and discussed. The advantage of DIHYDROSTREPTOMYCIN over plain streptomycin and penicillin is emphasised. This substance does not have the toxic effects of pure streptomycin, and appears to cover a somewhat wider field of organisms than penicillin. BACITRACIN, a filtrate from a pure culture of a spore-forming strain of *Bacillus subtilus*, appears to have a wide range of bacterial activity affecting gram-positive organisms together with the gonococcus and the meningococcus. This preparation is recommended for local application or injection because parenteral administration upsets kidney function. Penicillin-resistant organisms are sensitive to it, and penicillinase has no effect. It has the great advantage over penicillin that it is not inactivated by blood plasma, pus, or necrotic tissue, nor by the *Bact. coli* which is a notorious penicillinase producer. It may be applied by intranasal instillation, and is reported to have a beneficial effect on respiratory infections. It has also been used effectively in certain ophthalmic infections. It might thus be found to have a place in veterinary therapy.

The discovery and elaboration of VITAMIN B_{12} is described briefly and reference made to its value in the treatment of pernicious anaemia. B_{12} contains phosphorus, nitrogen and cobalt, but no sulphur, and provides the first example of the usefulness of cobalt as an essential element for man.

The new anthelmintic CAPARSIDE SODIUM (Abbott) for *Dirofilaria immitis* in dogs is briefly discussed as also are CHLOROMYCETIN and TUBOCURARINE. Chloromycetin is obtained from cultures of *Streptomyces venezuelae* and has proved effective against rickettsial as well as bacterial and virus infections. It is thus valuable in a wide series of diseases, the list including undulant fever, psittacosis, enteric infections and typhoid fever. The author points out that it would be well worth an extended trial in the veterinary field.

Tubocurarine chloride has a muscle relaxing effect and is of value in the reduction of muscular constrictions associated with electric shock or spasticity resulting from injury to the central nervous system. It has already been shown to be valuable in causing muscle relaxation in dogs, enabling bone pinning to be carried out more effectively. The dose varies according to the required effect; 1 mg. per 10 lb. bodyweight, given intravenously, will bring about muscular contraction under light anaesthesia.

N. S. B.

[The Immunisation of Mice against Group B Streptococci by the Intraperitoneal Inoculation of Living Cultures Combined with Penicillin. Pattison, I. H. (1949.) *J. Path. Bact.* **61.** 337–342.]

The author describes a series of experiments to demonstrate that penicillin can be used to control the lethal power of immunising doses of streptococci without seriously diminishing their antigenic activity. Three intraperitoneal injections each of 0·5 ml. (1,050 units) of calcium penicillin in distilled water were found to control the mouse-lethal effects of an intraperitoneal test dose of 0·5 ml. of an 18-hour whole Todd-Hewitt broth culture containing not less than 100 million living *Streptococcus agalactiae*. The penicillin was given one-half, two and six hours after the test dose. The test-dose penicillin routine was repeated at four- to seven-day intervals and created an active immunity in mice.

The same test dose of organisms was also largely controlled by a single inoculation of 1,000 units of procaine penicillin G given half an hour after test dose. This procedure, when repeated after seven days, also resulted in the production of an immunity. The calcium and the procaine penicillin caused but little detectable deleterious effect on the immune response of inoculated mice.

J. M.

REVIEW

[Contribuição para a Circurgia Abdominal do Cão. (1948.) E. A. Matera. Gráfica São José, Rua Galvão Bueno 230, São Paulo. Price unstated.]

This thesis is devoted entirely to the study of methods of incising the abdominal wall in preparation for laparotomy in the dog. After a fairly detailed consideration of the musculature, blood supply and innervation of the ventral wall of the abdomen, and a short reference to its physiological aspects, the author describes the technique of the longitudinal, transverse and combined or Sloan's incisions. (The technique of the flank incision is not mentioned.) For general use, the mid-line incision is recommended and it is the only practicable incision for the hypogastric region. For the mesogastric and epigastric regions, a paramedian incision is superior from both the anatomical and physiological points of view. This latter incision involves a mid-line cutting of the skin, to avoid damaging the praeputial muscle or the mammary glands, and a paramedian cutting of the deeper structures, which incidentally will avoid overlapping of the sutures. Although the simple and combined transverse incisions allow convenient access to the abdominal cavity, they are not recommended owing to (unspecified) difficulties in execution and the longer time required for their use. The clear diagrams with which the author illustrates his text will make this a useful monograph for the beginner in surgery.

Weekly Wisdom

Most enlightened poultry breeders—and most poultry breeders are enlightened—are aware of the menace of epidemic disease. They are all the more eager, therefore, to obtain authoritative advice on hygiene and eradication programmes, and it is here that the practitioner can help, for the treatment of individual fowls can seldom be economic and in few cases can it in fact be recommended.—Dr. R. F. Gordon in *The Veteran.*

NOTES AND NEWS

Diary of Events

Sept. 3rd–8th.—Sixty-eighth Annual Meeting and Congress of the National Veterinary Medical Association, at Cardiff.

Sept. 7th.—Annual General Meeting of the V.V.B.F. Ladies' Guild at Cardiff (City Hall), 10.30 a.m.

Sept. 15th.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton (Polygon Hotel), 6 p.m.

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N.V.M.A. Congress at Cardiff

Application for Tickets

With our last issue we included the ticket application form and particulars of the arrangements for social and other events at Cardiff.

Members are requested to apply early and not later than Monday, August 21st.

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Rations for Sick Horses detained in Veterinary Establishments

As was intimated in our last issue following upon representations made by the N.V.M.A. in the above matter, the Ministry of Food (Animal Feeding Stuffs Division) and the Ministry of Agriculture, in consultation, inform us that both Departments agree in principle with the Association's suggestion that veterinary surgeons may now be allowed a certain amount of oats and bran for feeding sick horses kept on their premises for operation or treatment.

In order that details of the scheme for such provision may be worked out, however, the Association has been asked to furnish the Ministry of Agriculture with the names and addresses of veterinary surgeons likely to be concerned. In the first instance, therefore, such members are requested to send this information as soon as possible to the General Secretary at 36, Gordon Square, London, W.C.1.

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PERSONAL

Births.—Arnold.—On July 17th, 1950, to Megan, wife of Geoffrey K. Arnold, a son.

Cooke.—On July 30th, 1950, to Diana, wife of Richard G. T. Cooke, M.R.C.V.S., Fairfield House, High Street, Petworth, a son.

Wooldridge.—On July 15th, 1950, in Nairobi, Kenya, to Constance, wife of Richard L. Wooldridge, a brother for John.

. . . . .

Marriage.—Toovey—Walpole.—The marriage took place on Saturday, July 29th, between James A. Toovey, B.SC., M.R.C.V.S., elder son of J. R. Toovey, B.SC., F.R.I.C.S., and Mrs. Toovey, of Bristol, and of Betty, only daughter of Mr. and Mrs. J. G. Walpole, of Eastbourne.

. . . .

Mr. Aubrey Ward's Election as County Alderman.—We are pleased to learn of the most recent recognition of the value of the local authority work of Mr. Aubrey E. Ward, M.R.C.V.S., of Slough, in the honour accorded him of election as an Alderman of the Bucks County Council. The extent of Mr. Ward's activities in this sphere is indicated by the fact that he has been an Alderman of the borough of Slough for the past ten years, and was made Mayor in 1940 and remained Mayor for five years; he has been Deputy Mayor for the past three and a half years until May this year.

Mr. Ward is now acting Chairman of the County Health Committee, while he is a member of the Bucks Executive Committee of the National Health Service and Chairman of the Staff Committee of the Windsor Group Hospital Management Committee, which embraces 16 hospitals.

VETERINARY SCIENCE IN QUEENSLAND

Dr. T. K. Ewer's Appointment

In its issue of July 22nd, *Nature* announces that Dr. T. K. Ewer, D.V.SC. (SYD.), M.A. (CANTAB), PH.D. (CANTAB), has been appointed to the chair of animal husbandry in the Veterinary Faculty of the University of Queensland and will arrive at Brisbane in August. This intimation is of particular interest to British veterinarians, inasmuch as Dr. Ewer was one of the first Australian veterinary surgeons to be registered on the Register of Veterinary Surgeons under the Veterinary Surgeons Act of 1881, when he came to work with Dr. Beveridge at Cambridge.

Thomas Keightley Ewer graduated in veterinary science from the University of Sydney in 1938. After graduation he spent nine years in New Zealand teaching and doing experimental work in animal husbandry at Lincoln Agricultural College, Christchurch. During the past two and a half years he has been investigating the metabolism of phosphorus and vitamin D in sheep in the Department of Animal Pathology, Cambridge, for which work he was awarded the degree of Ph.D. in 1949.

"The Veterinary Faculty of the University of Queensland," adds *Nature*, "was first established in 1936; but teaching ceased in 1942. In 1946 teaching was resumed for the three preclinical years, and Professor Ewer's appointment is the first move to re-establish the full five-year course. This chair is of special significance in being the first in animal husbandry in Australia, and its creation suggests the main direction in which the Queensland Veterinary School may be expected to develop. It is of interest to note that veterinary schools in South America are said to have recently reorganised their courses to give greater emphasis to animal production than to medicine. The requirements of the livestock industries in South America and Queensland obviously have much in common, so it is not surprising to see the same trends in veterinary education developing independently in these widely separated countries."

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FOOT-AND-MOUTH DISEASE RESEARCH STATION

The foot-and-mouth disease research station, hitherto conducted under the scientific direction of a committee appointed by the Minister of Agriculture, is now to join the group of research institutes being financed by grant-aid from the Ministry of Agriculture and coming under the scientific oversight of the Agricultural Research Council. The new governing body is being constituted by the Minister of Agriculture and the Secretary of State for Scotland, in agreement with the Agricultural and Medical Research Councils as a company limited by guarantee and without share capital, and in its membership representation of scientific interests both in medicine and animal health has been secured.

The following have been appointed members of the governing body:—

Dr. A. N. Drury, F.R.S. (Chairman), Dr. C. H. Andrewes, F.R.S., Professor S. P. Bedson, M.D., F.R.C.P., F.R.S., Mr. T. Dalling, M.R.C.V.S., F.R.S.E., Professor R. E. Glover, F.R.C.V.S., Dr. J. Russell Greig, M.R.C.V.S., F.R.S.E., Professor Wilson Smith, M.D., F.R.S., and Professor W. I. B. Beveridge, D.V.SC. (Sydney).

* * * * *

SWINE FEVER

Imposition of Restrictions on the Movement and Marketing of Swine

In consequence of the spread of swine fever in Great Britain during recent months the Minister of Agriculture has decided that some restrictions on the movement and marketing of swine should again be imposed. Outbreaks of the disease have occurred in widely separated districts in the last few weeks, and infection has been carried to many premises because of the movement of diseased pigs through markets.

The Minister has therefore made an Order which prescribes a scheduled area comprising England (except the counties of Cumberland, Northumberland and Westmorland, the Furness District of Lancashire and certain parishes in the western part of Shropshire), Glamorgan and Monmouth in which it will, from August 6th, 1950, be illegal

(*a*) to hold a sale of swine in any market, fairground or saleyard, unless the sale is authorised by the local authority;

(*b*) to move swine from any market, fairground or saleyard, unless the movement is authorised by a licence granted by an Inspector of the local authority;

(*c*) to move swine from any collecting centre, except direct to a slaughterhouse or bacon factory or, under licence, back to the premises from which they came.

Movements of swine from pig-dealers' premises must be authorised by licence; no movements from such premises to any market, fairground or saleyard which is not a Ministry of Food collecting centre will be allowed.

Swine moved under licence to any premises except a collecting centre, slaughterhouse or bacon factory must be detained there for 28 days and, during that period, be isolated from all other swine. Swine moved to a slaughterhouse or bacon factory in the scheduled area must be detained there until slaughtered.

Copies of the Order, which is entitled the Regulation of Movement of Swine Order, 1950, may be obtained from H.M. Stationery Office or from the Ministry of Agriculture and Fisheries, Hook Rise, Tolworth, Surbiton, Surrey.

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British Association of Allergists: Proposed Discussion on Veterinary and Comparative Aspects of Allergy.—It is hoped that at the annual general meeting of the British Association of Allergists, to be held in London in January, 1951, a discussion upon the veterinary and comparative aspects of allergy will be arranged, and that members of the veterinary profession will take part in this discussion.

It would be of assistance if veterinary surgeons who wish to participate would communicate as soon as possible either with the President of the Association, Dr. Vera B. Walker, 24, Beaumont Street, Oxford, or with Professor Alastair N. Worden, Cromwell House, Huntingdon.

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ANIMAL DISEASES RESEARCH ASSOCIATION

Dr. Russell Greig's Report on the Work of the Moredun Institute

Addressing the annual meeting of the Animal Diseases Research Association, on July 26th, Sir Andrew Murray, the Lord Provost of Edinburgh, said that the policy of the Association, since its inauguration in 1920, had been the pursuit of applied research into certain diseases of farm livestock which had been selected for study. As a result of its continuous, sustained efforts the Association had conferred incalculable benefits upon agriculture—a fact that received ready testimony from stockmen throughout Scotland. He wished the institute every success, and he trusted that the work undertaken there might become increasingly well known and increasingly appreciated by his fellow-citizens, because it was work that brought a great deal of credit to the city itself.

In the course of his 21st annual statement, which included a survey of work in progress at the Moredun Institute, Dr. J. Russell Greig, C.B.E., M.R.C.V.S., the Director, dealt first with louping ill, saying that extended tests had proved that the vaccine they had evolved afforded adequate protection to cattle as well as to sheep—a fact of some importance since many more cattle were now being grazed on tick-infested marginal land. The work on scrapie had reached a stage when experimental vaccines could be tested for their immunising qualities.

They were also concerned in the investigation of bracken poisoning, and in this they were in close collaboration with the Scottish Veterinary Investigation Officer Service. For some years past they had carried out surveys of the incidence of bracken poisoning in Scotland, and these indicated that the disease was prevalent only in certain areas, while other areas, many of which were heavily colonised by bracken, appeared to be completely free from the disease. The institute was in touch with work at other centres where it had been shown that one of the important factors in the causation of bracken poisoning was probably a deficiency of vitamin B_1. Last year tests were made on the curative value of the vitamin. These yielded encouraging but indefinite results, and the work was being continued on a larger scale during the present bracken poisoning season in an area in the south-west of Scotland where the disease was usually prevalent.

"The old problem of grass sickness of horses, with which we have been so long beset, still continues to remain a problem," continued Dr. Greig, who reported that attempts to transmit the disease experimentally had been repeated, and a study was being made of certain portions of the nervous mechanism controlling bowel movements; in this they had the collaboration of an eminent neuropathologist. Close touch was being maintained with their veterinary colleagues in Denmark, where the disease was known to have been in existence since 1938, but beyond that he had nothing further to report, other than the fact that in spite of their ill-success in this investigation or maybe rather because of it, their researches would continue.

In a reference to the general policy of the A.D.R.A. Dr. Greig said that so rapid had been the acquisition of our knowledge concerning the major diseases of farm livestock in this country that he believed they were quickly reaching a stage when the general line

of A.D.R.A's. future research must be given another direction, in that fundamental or academic research must, more and more, take the place of applied research.

The President, Mr. George C. Mercer, on behalf of the directors, presented a wallet of Treasury notes to Mr. A. R. Milroy in appreciation of his long and valuable service to the association. Mr. Milroy is retiring after 25 years as secretary and treasurer of the association, and is being succeeded by Mr. D. M. Cameron, A.C.I.S., an administrative assistant in Edinburgh Corporation Public Health Department.

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CHECK IN BIRMINGHAM CORPORATION HORSE DECLINE

"For years, the Chief Veterinary Officer of Birmingham noted 12 months ago, the decline in the number of horses in the municipal service had been steady and continuous at the rate of about 40 annually: from 800 in pre-war years, the total had fallen to 120.

"Yesterday, however, when, by custom, the Lord Mayor inspected the Corporation stables, he was told" (says *The Birmingham Post* in its issue of July 24th) "that the rate of decline had fallen—instead of the 80 or so horses he might have expected to find, there were 100. This is a timely reminder that the horse is not yet to be succeeded entirely by horse power. For long, the horse has been disappearing from our city streets, but as a means of haulage, he is an unconscionable time a-dying. He would, indeed, seem almost to have entered upon a new lease of life, for 'more than the present number could be usefully employed if sufficient young men would come forward to work as drivers.'"

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RABIES IN THE UNITED STATES

Veterinary Medicine states that the number of cases of rabies during 1949, as reported by the Bureau of Animal Industry, USDA, indicates the lowest incidence of this disease since 1946.

Tabulated by occurrence in animal species:—

Dogs	5,237
Cattle	639
Cats	413
Swine	54
Horses	24
Sheep	22
Goats	6
Man	10
Miscellaneous	1,192
Total ...	7,597

This number is less than that reported for 1948 by 1,878. No rabies was reported from 13 States, and six others reported not over three cases.

Kentucky tabulated 707 cases in dogs and 315 in other species. This total of 1,022 was the largest recorded in any one State. Kentucky, Indiana, and Ohio reported an aggregate of 2,426 cases, or approximately one-third of the total for the nation. Though the incidence of rabies in these and adjoining States was considerably reduced from that reported in 1948, it nevertheless identifies this section as having the highest rate of rabies infection.

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DANGEROUS INSECTICIDES IN AGRICULTURE

The Minister of Agriculture and Fisheries has appointed a working party on precautionary measures against toxic chemicals used in agriculture. Its terms of reference are: To make recommendations for the promotion of the safety of workers in the agricultural use of substances which are toxic or harmful to human beings, and, in particular, to advise on the recommendations on this subject made in the report of the Gowers committee on health, safety and welfare in non-industrial employment.

The membership of the working party is as follows:—

Professor S. Zuckerman (Chairman), Mr. A. B. Bartlett, Mr. R. A. E. Galley, Mr. C. T. Gimingham, Mr. A. Holness, Mr. W. Morley Davies, Mr. R. G. C. Nisbet, Mr. J. M. Rogan, and Mr. H. Cole Tinsley, with, as joint secretaries, Mr. K. R. Allen and Mr. J. T. Martin.

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Chemical Agents for Cleansing Dairy Equipment.—Under the Milk and Dairies Regulations, 1949, which came into operation on October 1st, 1949, the use of oxidising or preservative agents approved by the Minister of Agriculture and Fisheries and the Minister of Food is permitted in the cleansing of dairy equipment as an alternative to scalding with boiling water or steam. A list of these products (all of which are solutions of sodium hypochlorite), together with the names and addresses of manufacturers, can be obtained from the Ministry of Agriculture and Fisheries (Dairy Husbandry Branch), 14-21, Chester Terrace, Regent's Park, London, N.W.1.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

HOMOEOPATHY IN THE VETERINARY FIELD

Sir,—Many years ago, at the instance of Professor G. H. Wooldridge, I treated a case of chronic disease of many years' standing by homoeopathic means. The rapid cure within a short space of time was an exciting and intriguing experience that led me to make a study of the Hahnemann school of physic. It was not long before I realised that this particular discipline had a considerable field of use in the repertory of the animal physician, and for a quarter of a century now I have had reason to be thankful for the widening of the therapeutic horizon that a study of the homoeopathic philosophy brings.

It is now suggested that the not inconsiderable number of veterinary surgeons who to a greater or less extent use homoeopathic drugs, should be brought together in closer association, not only with each other but with the medical practitioners of homoeopathy. The British Homoeopathic Association has expressed its keen interest and desire to co-operate to this end. If sufficient support is forthcoming, it is proposed to form a veterinary section of the Association on similar lines to the Comparative Section of the Royal Society of Medicine, which Sir Frederick Hobday organised with such energy and prescience many years ago.

May I therefore appeal to those who are interested to write to me at once, c/o The Acting Secretary, The British Homoeopathic Association, Chalmers House, 43, Russell Square, London, W.C.1, with a view to the calling, in the near future, of a meeting to discuss future plans.

Yours faithfully,

Springhurst, Ecchinswell, Newbury, Berks. R. C. G. Hancock.

July 28th, 1950.

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ATTESTATION: IS IT A GOOD POLICY?

The "Biological Co-operation" Approach to Problems of Disease

Sir,—Certain phrases and paragraphs in the letter from Dr. le Roux, published in your issue of July 22nd, have helped to crystallise in my mind some perhaps at present rather nebulous views and conclusions to which prolonged observation and much thought have been leading me. Dr. le Roux has referred to what I might call the ecological factors behind disease and stressed the importance of their study. There is a rhythm in nature which in the long run is immutable; the necessities of modern agriculture have interfered with this rhythm by substituting methods of revolution for those of evolution, by upsetting the balance of agriculture and mixed farming, by chronic over-feeding, and, most disastrous of all, by a prolonged attempt to maintain autumn calving. We have gone too far and too fast, and what happens? Research organisations spring up and deal almost *in vacuo* with certain diseases or aspects of disease, touching only the fringe of the basic problem. They chase ova down oviducts with luteinising hormone, but have to slow them up again with stilboestrol to enable the spermatozoa to swim against the stream. And so on, losing sight of the wood in their enthusiasm for the trees. I do not, of course, wish to decry the magnificent and useful work now being done, but some of it seems to be applied science gone mad, as mad as is that of the physicists who study to destroy mankind rather than to save it. I submit (with but little deference!) that the disease position, particularly with regard to infertility, is now so serious that it is, in spite of such work as Mr. Hignett's brilliant study of the importance of the Ca: P ratio, beyond our capacity to improve by piecemeal methods which are at best only palliative and at worst harmful. I am perfectly certain, however, that if we can get over our "put another needle in" outlook we can save the livestock industry from a slow eclipse—and that no one else can—by pointing the way to a more sane and biological co-operation with nature's rhythms. The recent Veterinary Surgeons Act, by giving the profession university status, gives us a great opportunity—but only if we seize it with a loud voice and make agriculture listen.

Yours faithfully,

Chipping Norton, Oxon. Paul Crosfield.

August 2nd, 1950.